

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

- 1 1. (Original) A method of converting an abstract quality of service policy into a new  
2 configuration for one or more network devices, the method comprising the computer-  
3 implemented steps of:  
4 receiving and converting the abstract quality of service policy into a first set of one or  
5 more basic commands;  
6 receiving one or more first command line interface (CLI) commands that represent a  
7 current configuration of a network device;  
8 determining a second set of one or more basic commands that correspond to the current  
9 configuration of the network device, based on the first CLI commands;  
10 transforming the first and second sets of basic commands into one or more second CLI  
11 commands which, when executed by the network device, will create a new  
12 configuration for the network device that implements the abstract quality of  
13 service policy;  
14 wherein merging and aggregation is carried out on the first and second sets of basic  
15 commands based on state values associated with the basic commands.
- 1 2. (Original) A method as recited in Claim 1, wherein the step of transforming the first and  
2 second sets of basic commands comprises the steps of merging and aggregating the first  
3 and second sets of basic commands by eliminating duplicate commands and combining  
4 similar commands.
- 1 3. (Currently amended) A method as recited in Claim 2, wherein the steps of receiving and  
2 converting the abstract quality of service policy comprise the steps of:  
3 receiving and analyzing one or more abstract policies that are defined by a user using a  
4 quality of service management system;  
5 creating one or more corresponding instances of basic command objects, to result in  
6 creating and storing ~~an initial~~ a first set of basic commands that represent the  
7 abstract policies.

1 4. (Currently amended) A method as recited in Claim 3, wherein the steps of receiving one  
2 or more first command line interface (CLI) commands and determining a second set of  
3 one or more basic commands comprise the steps of:  
4 receiving the ~~initial~~-first set of basic commands;  
5 analyzing a current configuration of the network device;  
6 determining a third set of one or more CLI commands which, if executed by the network  
7 device, would result in creating the current configuration;  
8 converting the third set of one or more CLI commands into a set of one or more uploaded  
9 basic commands.

1 5. (Currently amended) A method as recited in Claim 4, wherein the steps of merging and  
2 aggregating the first and second sets of basic commands comprises the steps of:  
3 receiving the set of uploaded basic commands;  
4 comparing the ~~initial~~-first set of basic commands to the set of uploaded basic commands;  
5 creating and storing a final list of basic commands by determining a minimal set of basic  
6 commands which, if executed by the network device, would result in creating a  
7 new device configuration that implements the abstract policy.

1 6. (Original) A method as recited in Claim 5, further comprising the steps of assigning a  
2 state value of each basic command in the final list of basic commands upon creation of  
3 each basic command.

1 7. (Original) A method as recited in Claim 6, wherein the step of transforming the first and  
2 second sets of basic commands comprises the steps of:  
3 receiving the final list of basic commands;  
4 based on the state value of each basic command in the final list, translating each basic  
5 command in the final list into one or more second CLI commands which, when  
6 executed by the network device, will create a new configuration for the network  
7 device that implements the abstract quality of service policy.

1 8. (Original) A method as recited in Claim 1, further comprising the step of assigning a  
2 state value of DO to each basic command in the first set upon creation of such basic  
3 command, wherein such state value indicates that the associated basic command must be  
4 deployed to the network device as part of deploying the new configuration.

1 9. (Original) A method as recited in Claim 1, further comprising the step of selectively  
2 assigning a state value UNDO or EXIST to each basic command in the second set of  
3 basic commands, wherein a state value of UNDO indicates that the associated basic  
4 command should be removed from the network device as part of deploying the new  
5 configuration, and wherein a state value of EXIST indicates that the associated basic  
6 command is currently configured on the network device and may be removed or retained  
7 as part of deploying the new configuration.

1 10. (Original) A method as recited in Claim 8, wherein the steps of merging and aggregating  
2 the first and second sets of basic commands comprises the steps of:  
3 based on the state value of each basic command in the final list, translating each basic  
4 command in the final list into one or more second CLI commands which, when  
5 executed by the network device, will create a new configuration for the network  
6 device that implements the abstract quality of service policy;  
7 when two of the basic commands in the final list are equivalent without considering their  
8 associated state values, and when one of the two commands has a state value of  
9 DO and the second of the two commands has a state value of UNDO, merging the  
10 two commands into one new command having a state value of EXIST.

1 11. (Original) A computer-readable medium carrying one or more sequences of instructions  
2 for converting an abstract quality of service policy into a new configuration for one or  
3 more network devices, which instructions, when executed by one or more processors,  
4 cause the one or more processors to carry out the steps of:  
5 receiving the abstract quality of service policy;

6 converting the abstract quality of service policy into a first set of one or more basic  
7 commands;  
8 receiving one or more first command line interface (CLI) commands that represent a  
9 current configuration of a network device;  
10 determining a second set of one or more basic commands that correspond to the current  
11 configuration of the network device, based on the first CLI commands;  
12 transforming the first and second sets of basic commands into one or more second CLI  
13 commands which, when executed by the network device, will create a new  
14 configuration for the network device that implements the abstract quality of  
15 service policy;  
16 wherein merging and aggregation is carried out on the first and second sets of basic  
17 commands based on state values associated with the basic commands.

- 1 12. (Original) An apparatus for converting an abstract quality of service policy into a new  
2 configuration for one or more network devices, comprising:  
3 a quality of service management system that is coupled to a managed network comprising  
4 the one or more network devices and including means for creating and storing an  
5 abstract policy defining a quality of service for use by the network devices in  
6 carrying one or more network traffic flows;  
7 means for converting the abstract quality of service policy into a first set of one or more  
8 basic commands;  
9 means for receiving one or more first command line interface (CLI) commands that  
10 represent a current configuration of a network device;  
11 means for determining a second set of one or more basic commands that correspond to  
12 the current configuration of the network device, based on the first CLI commands;  
13 and  
14 means for transforming the first and second sets of basic commands into one or more  
15 second CLI commands which, when executed by the network device, will create a  
16 new configuration for the network device that implements the abstract quality of  
17 service policy;

18 wherein merging and aggregation is carried out on the first and second sets of basic  
19 commands based on state values associated with the basic commands.

- 1 13. (Original) An apparatus for converting an abstract quality of service policy into a new  
2 configuration for one or more network devices, comprising:  
3 a quality of service management system that is coupled to a managed network comprising  
4 the one or more network devices and including means for creating and storing an  
5 abstract policy defining a quality of service for use by the network devices in  
6 carrying one or more network traffic flows;  
7 basic command processing logic coupled to the quality of service management system  
8 and comprising one or more sequences of instructions which, when executed by  
9 one or more processors, causes the one or more processors to execute the steps of:  
10 converting the abstract quality of service policy into a first set of one or more  
11 basic commands;  
12 receiving one or more first command line interface (CLI) commands that  
13 represent a current configuration of a network device;  
14 determining a second set of one or more basic commands that correspond to the  
15 current configuration of the network device, based on the first CLI  
16 commands; and  
17 transforming the first and second sets of basic commands into one or more second  
18 CLI commands which, when executed by the network device, will create a  
19 new configuration for the network device that implements the abstract  
20 quality of service policy;  
21 wherein merging and aggregation is carried out on the first and second sets of  
22 basic commands based on state values associated with the basic  
23 commands.

- 1 14. (Original) A method as recited in Claim 1, wherein each basic command expresses  
2 control for a network device at an intermediate level of abstraction that is lower than the  
3 abstract policy and higher than the CLI commands.

1 15. (Original) In a quality of service policy management system that controls deployment of  
2 quality of service policies to a plurality of routers in a managed network, a method of  
3 converting an abstract quality of service policy into a new configuration for one or more  
4 of the routers, the method comprising the computer-implemented steps of:  
5 receiving the abstract quality of service from the quality of service policy management  
6 system;  
7 converting the abstract quality of service policy into an initial set of one or more basic  
8 commands;  
9 receiving one or more first router command line interface (CLI) commands that represent  
10 a current configuration of one of the routers;  
11 determining a set of one or more uploaded basic commands that correspond to the current  
12 configuration of the router, based on the first CLI commands;  
13 creating and storing a final set of basic commands based on the initial set of basic  
14 commands and the uploaded basic commands;  
15 transforming the final set of basic commands into one or more second CLI commands  
16 which, when executed by the router, will create a new configuration for the router  
17 that causes the router to implement the abstract quality of service policy;  
18 wherein merging and aggregation is carried out on the first and second sets of basic  
19 commands based on state values associated with the basic commands.

1 16. (Original) A method as recited in Claim 15, wherein the step of transforming the final set  
2 of basic commands comprises the steps of merging and aggregating the initial set and  
3 uploaded basic commands by eliminating duplicate commands and combining similar  
4 commands.

1 17. (Original) A method as recited in Claim 15, wherein the steps of determining a set of one  
2 or more uploaded basic commands comprise the steps of:  
3 receiving the initial set of basic commands;  
4 analyzing a current configuration of the network device;

5 determining an interim set of one or more CLI commands which, if executed by the  
6 network device, would result in creating the current configuration;  
7 converting the interim set of one or more CLI commands into a set of one or more  
8 uploaded basic commands.

1 18. (Original) A method as recited in Claim 16, wherein the steps of merging and  
2 aggregating the initial first and second sets of basic commands comprises the steps of:  
3 receiving the set of uploaded basic commands;  
4 comparing the initial set of basic commands to the set of uploaded basic commands;  
5 creating and storing a final list of basic commands by determining a minimal set of basic  
6 commands which, if executed by the network device, would result in creating a  
7 new device configuration that implements the abstract policy.

1 19. (Original) A method as recited in Claim 15, further comprising the steps of assigning a  
2 state value of each basic command in the final list of basic commands upon creation of  
3 each basic command.

1 20. (Original) A method as recited in Claim 15, further comprising the step of assigning a  
2 state value of DO to each basic command in the initial set upon creation of such basic  
3 command, wherein such state value indicates that the associated basic command must be  
4 deployed to the network device as part of deploying the new configuration.

1 21. (Original) A method as recited in Claim 15, further comprising the step of selectively  
2 assigning a state value UNDO or EXIST to each basic command in the set of uploaded  
3 basic commands, wherein a state value of UNDO indicates that the associated basic  
4 command should be removed from the network device as part of deploying the new  
5 configuration, and wherein a state value of EXIST indicates that the associated basic  
6 command is currently configured on the network device and may be removed or retained  
7 as part of deploying the new configuration.

1 22. (Original) A method as recited in Claim 21, wherein the steps of merging and  
2 aggregating the initial and uploaded sets of basic commands comprises the steps of:  
3 based on the state value of each basic command in the final list, translating each basic  
4 command in the final list into one or more second CLI commands which, when  
5 executed by the network device, will create a new configuration for the network  
6 device that implements the abstract quality of service policy;  
7 when two of the basic commands in the final list are equivalent without considering their  
8 associated state values, and when one of the two commands has a state value of  
9 DO and the second of the two commands has a state value of UNDO, merging the  
10 two commands into one new command having a state value of EXIST.

1 23. (Currently amended) A method of converting aan abstract quality of service policy into  
2 a configuration for one or more network devices, the method comprising the computer-  
3 implemented steps of:  
4 receiving and converting the abstract quality of service policy into a first set of  
5 commands;  
6 receiving a current configuration of a network device;  
7 determining a second set of one or more commands that correspond to the current  
8 configuration of the network device, based on the received current configuration;  
9 transforming the first and second sets of commands into a third set of commands which,  
10 when executed by the network device, will create a new configuration for the  
11 network device that implements the abstract quality of service policy.

1 24. (Original) A method as recited in Claim 23, wherein the step of transforming the first  
2 and second sets of commands comprises the steps of merging and aggregating the first  
3 and second sets of commands by eliminating duplicate commands and combining similar  
4 commands.

1 25. (Currently amended) A method as recited in Claim 24, wherein the steps of receiving  
2 and converting the abstract quality of service policy comprise the steps of:

3 receiving and analyzing one or more abstract policies that are defined by a user using a  
4 quality of service management system;  
5 creating one or more corresponding instances of command objects, to result in creating  
6 and storing ~~an initial~~ a first set of commands that represent the abstract policies.

1 26. (Currently amended) A method as recited in Claim 25, wherein the steps of receiving a  
2 current configuration of the network device and determining a second set of commands  
3 comprise the steps of:  
4 receiving the ~~initial~~ first set of commands;  
5 analyzing a current configuration of the network device;  
6 determining a third set of commands which, if executed by the network device, would  
7 result in creating the current configuration;  
8 converting the third set of commands into a set of one or more uploaded commands.

1 27. (Currently amended) A method as recited in Claim 26, wherein the steps of merging and  
2 aggregating the first and second sets of commands comprises the steps of:  
3 receiving the set of uploaded commands;  
4 comparing the ~~initial~~ first set of commands to the set of uploaded commands;  
5 creating and storing a final list of commands by determining a minimal set of commands  
6 which, if executed by the network device, would result in creating a new device  
7 configuration that implements the abstract quality of service policy.

1 28. (Original) A method as recited in Claim 27, further comprising the steps of assigning  
2 a state value of each command in the final list of commands upon creation of each  
3 command.

1 29. (Original) A method as recited in Claim 28, wherein the step of transforming the first  
2 and second sets of commands comprises the steps of:  
3 receiving the final list of commands;

4 based on the state value of each command in the final list, translating each command in  
5 the final list into a third set of commands which, when executed by the network  
6 device, will create a new configuration for the network device that implements the  
7 abstract quality of service policy.

1 30. (Original) A method as recited in Claim 23, further comprising the step of assigning a  
2 state value of DO to each command in the first set upon creation of such command,  
3 wherein the state value of "DO" indicates that the associated command must be deployed  
4 to the network device as part of deploying the new configuration.

1 31. (Original) A method as recited in Claim 23, further comprising the step of selectively  
2 assigning a state value UNDO or EXIST to each command in the second set of  
3 commands, wherein the state value of UNDO indicates that the associated command  
4 should be removed from the network device as part of deploying the new configuration,  
5 and wherein the state value of EXIST indicates that the associated command is currently  
6 configured on the network device and may be removed or retained as part of deploying  
7 the new configuration.

1 32. (Original) A method as recited in Claim 30, wherein the steps of merging and  
2 aggregating the first and second sets of commands comprises the steps of:  
3 based on the state value of each command in the final list, translating each command in  
4 the final list into a third set of commands which, when executed by the network  
5 device, will create a new configuration for the network device that implements the  
6 abstract quality of service policy;  
7 when two of the commands in the final list are equivalent without considering their  
8 associated state values, and when one of the two commands has a state value of  
9 DO and the second of the two commands has a state value of UNDO, merging the  
10 two commands into one new command having a state value of EXIST.

1 33. (Original) A computer-readable medium carrying one or more sequences of  
2 instructions for converting an abstract quality of service policy into a new configuration  
3 for one or more network devices, which instructions, when executed by one or more  
4 processors, cause the one or more processors to carry out the steps of:  
5 receiving the abstract quality of service policy;  
6 converting the abstract quality of service policy into a first set of one or more commands;  
7 receiving a current configuration of a network device;  
8 determining a second set of one or more commands that correspond to the current  
9 configuration of the network device, based on the received configuration;  
10 transforming the first and second sets of commands into a third set of commands which,  
11 when executed by the network device, will create a new configuration for the  
12 network device that implements the abstract quality of service policy.

1 34. (Original) An apparatus for converting an abstract quality of service policy into a  
2 new configuration for one or more network devices, comprising:  
3 a quality of service management system that is coupled to a managed network comprising  
4 the one or more network devices and including means for creating and storing a  
5 quality of service policy for use by the network devices in carrying one or more  
6 network traffic flows;  
7 means for converting the quality of service policy into a first set of one or more  
8 commands;  
9 means for receiving a current configuration of a network device;  
10 means for determining a second set of one or more commands that correspond to the  
11 current configuration of the network device, based on the first commands; and  
12 means for transforming the first and second sets of commands into a third set of  
13 commands which, when executed by the network device, will create a new  
14 configuration for the network device that implements the quality of service policy.

1 35. (Original) An apparatus for converting a quality of service policy into a new  
2 configuration for one or more network devices, comprising:  
3 a quality of service management system that is coupled to a managed network comprising  
4 the one or more network devices and including means for creating and storing a  
5 quality of service policy for use by the network devices in carrying one or more  
6 network traffic flows;  
7 command processing logic coupled to the quality of service management system and  
8 comprising one or more sequences of instructions which, when executed by one or  
9 more processors, causes the one or more processors to execute the steps of:  
10 converting the quality of service policy into a first set of one or more commands;  
11 receiving a current configuration of a network device;  
12 determining a second set of one or more commands that correspond to the current  
13 configuration of the network device, based on the received configuration;  
14 and  
15 transforming the first and second sets of commands into a third set of commands  
16 which, when executed by the network device, will create a new  
17 configuration for the network device that implements the abstract quality  
18 of service policy.

1 36. (Currently amended) A method as recited in Claim 23, wherein each command in the  
2 first and second set of commands expresses control for a network device at an  
3 intermediate level of abstraction that is lower than the abstract quality of service policy  
4 and higher than the received configuration.